Spin Electronics for the 21st Century

Program Solicitation

NSF 02-036

DIRECTORATE FOR ENGINEERING
DIVISION OF ELECTRICAL AND COMMUNICATIONS SYSTEMS
DIVISION OF CHEMICAL AND TRANSPORT SYSTEMS
DIVISION OF CIVIL AND MECHANICAL SYSTEMS
DIVISION OF DESIGN, MANUFACTURE, AND INDUSTRIAL INNOVATION
DIRECTORATE FOR SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES
OFFICE OF INTERNATIONAL SCIENCE AND ENGINEERING

FULL PROPOSAL DEADLINE(S): March 15, 2002

NATIONAL SCIENCE FOUNDATION

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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: Spin Electronics for the 21st Century

Synopsis of Program: The National Science Foundation (NSF), through its Division of Electrical and Communications Systems (ECS), Division of Civil and Mechanical Systems (CMS), Division of Chemical and Transport Systems (CTS) and Division of Design, Manufacturing and Industrial Innovation (DMII), of the Directorate for Engineering; and the Office of International Science and Engineering(INT) of the Directorate for Social, Behavioral, and Economic Sciences (SBE), announces an Initiative on Spin Electronics for the 21st Century. This focused initiative seeks high-risk/high-return research on novel concepts in Spin Electronics and its applications. Emphasis will be on enabling technologies critical to the continued growth of Spin Electronics in the next decade to address the scientific issues and technological challenges associated with the underpinnings of quantum and coherent spin electronics, storage and sensing demands of information technology, quantum computing, quantum communications, and revolutionary molecular, chemical and mechanical systems.

Cognizant Program Officer(s):

- Usha Varshney, Program Director, ENG/ECS, Division of Electrical and Communications Systems, telephone: (703) 292-8339, e-mail: uvarshne@nsf.gov.
- Rajinder Khosla, Acting Division Director, ENG/ECS, Division of Electrical and Communications Systems, telephone: (703) 292-8339, e-mail: rkhosla@nsf.gov.
- Jorn Larsen-Basse, Program Director, ENG/CMS, Division of Civil and Mechanical Systems, telephone: (703) 292-8360, e-mail: jlarsenb@nsf.gov.
- Shih-Chi Liu, Program Director, ENG/CMS, Division of Civil and Mechanical Systems, telephone: (703) 292-8360, e-mail: sliu@nsf.gov.
- Maria Burka, Program Director, ENG/CTS, Division of Chemical and Transport Systems, telephone: (703) 292-7030, e-mail: mburka@nsf.gov.
- Robert Wellek, Deputy Director, ENG/CTS, Division of Chemical and Transport Systems, telephone: (703) 292-8370, e-mail: rwellek@nsf.gov.
- Charalabos Doumanidis, Program Director, ENG/DMII, Division of Design, Manufacture, and Industrial Innovation, telephone: 703) 292-7088, e-mail: cdoumani@nsf.gov.

- Donald Senich, Program Director, ENG/DMII, Division of Design, Manufacture, and Industrial Innovation, telephone: (703) 292-7082, e-mail: dsenich@nsf.gov.

- Mark Suskin, Program Director, SBE/INT, Office of International Science and Engineering, telephone: (703) 292-8702, e-mail: msuskin@nsf.gov.

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering

- 47.075 --- Social, Behavioral and Economic Sciences

ELIGIBILITY INFORMATION

- **Organization Limit:** Proposals may only be submitted by U.S academic institutions and nonprofit research institutions in support of single investigators or small interdisciplinary groups of two or more investigators.

- **PI Eligibility Limit:** Only one proposal may be submitted by a Principal Investigator. A Principal Investigator for one proposal may be a co-Principal Investigator on one other proposal. Applicants for small group awards should contact a Cognizant Program Officer listed in this document prior to proposal submission to clarify the appropriateness of the contemplated group proposal.

- **Limit on Number of Proposals:** None

AWARD INFORMATION

- **Anticipated Type of Award:** Standard or Continuing Grant

- **Estimated Number of Awards:** 10-15

- **Anticipated Funding Amount:** $4.5 million in FY 2002. Awards up to $300,000 for a single investigator and up to $600,000 for a small interdisciplinary group for a duration of three years are anticipated, pending the availability of funds.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Full Proposals:** Standard Preparation Guidelines

    - Standard GPG Guidelines apply.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required.
- **Indirect Cost (F&A) Limitations:** None
- **Other Budgetary Limitations:** Not Applicable.

C. Deadline/Target Dates

- **Letters of Intent (*optional*):** None
- **Preliminary Proposals (*optional*):** None
- **Full Proposal Deadline Date(s):** March 15, 2002

D. FastLane Requirements

- **FastLane Submission:** Required
- **FastLane Contact(s):**
    - Gwendolyn Owens, Administrative Officer, ENG/ECS, Electrical and Communications Systems, telephone: (703) 292-8339, e-mail: gowens@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria apply.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

I. INTRODUCTION

There is strong evidence that a paradigm shift will take place from traditional semiconductors to spin-dependent devices to meet the sensing and storage demands of information technology in the 21st Century. In addition to storage applications, spin electronics in the next decade will result in new approaches to quantum and coherent spin electronics, quantum computing, quantum communications, and revolutionary molecular, chemical and mechanical systems. Next generation portable communications systems will demand miniaturization and integration of low-power electronic devices resulting from spin-dependent phenomena and associated electronics. The confluence of semiconductors and magnetic devices has been triggered by the discovery and technology insertion of giant magnetoresistive materials. Researchers interacting from both fields have defined a new technology area called Spin Electronics where, in addition to, or in place of electron charge, the electron spin also carries information. The use of both charge and spin degrees of freedom in semiconductors is believed to enable a revolutionary class of electronics whose functionality will surpass that of existing semiconductor technology. The significance of spin devices would be non-volatility, increased data processing speed, decreased electric power consumption, and increased integration densities compared to semiconductor devices. The expected market is very large (over $50 billion annually) and research advances promise breakthroughs that can have a persuasive impact on technological developments. Consequently, there is a need to address scientific issues and challenges associated with the underpinnings of Spin Electronics. This initiative will solidify the infrastructure that will enhance scientific understanding of key phenomena in Spin Electronics and will accelerate applications in industry and society in order to promote economic growth. The goal will be to advance and establish the basic science and technology needed to explore, control and utilize the spin degrees of freedom in, but not limited to, ferromagnetic and diluted magnetic semiconductors, metallic multilayers and hybrid structures.

II. PROGRAM DESCRIPTION

This focused initiative seeks high-risk/high-pay-off studies of novel engineering concepts in Spin Electronics and its applications. Proposals are sought under this announcement that address major advances in the state-of-the-art of Spin Electronics with the goal of producing significant benefits to society. This research will be carried out in small, multi-disciplinary groups, with the objective of generating new concepts and approaches stimulated by the interaction of diverse disciplines. Novel stand-alone concepts and breakthrough ideas are encouraged. Proposals offering incremental advances of existing technologies are discouraged. Research should focus on critical enabling engineering technologies for long-term growth. Such research might include concepts for theoretical and experimental aspects of spin dynamics and transport phenomena, growth and processing of novel materials and structures, metrology, and chemical and mechanical interfaces, devices and systems. The initiative bridges science and technology by introducing degrees of freedom associated with spins. The intent of this initiative is to promote the evolution of thoughts and techniques that address issues ranging from fundamental concepts to applications. Proposals should discuss effective ways in which education and outreach are integrated within the research program to achieve the broader impacts of the proposed activity.

Cooperative activities among academia, industry, and national laboratories as well as the use of shared facilities and international collaborations are encouraged. International collaborations should identify the names and institutions of the collaborators, the nature and goals of their research, and the international synergies and benefits to be gained from the collaboration. Foreign institutions may not apply directly for funding. International activities normally sponsored by the Division of International Programs (http://www.nsf.gov/sbe/int/) will be considered. Proposals involving industrial partnerships following the Grant Opportunities for Academic Liaison with Industry (GOALI,http://www.nsf.gov/home/crssprgm/goali/) guidelines are highly encouraged.

TOPICAL AREAS:

This initiative will provide research support under five broadly defined topical areas. Specific areas include, but are not limited to, the following subtopics:

Spin - related Phenomena - theoretical and experimental engineering aspects of spin dynamics and transport including polarization, coupling, relaxation, injection, coherence, propagation, accumulation, dimentionality, manipulation, scattering and tunneling. Fundamental relationships among electronic, magnetic, optical and structural properties in ferromagnetic and diluted magnetic semiconductors, metallic multilayers and hybrid structures.

Growth and Processing of Novel Structures – spin engineering to extend the range of material choices for device designers, including processing and up-scaling synthesis techniques for materials and structures and methods to control interface and spin injection properties. Novel materials having strong spin-dependent interactions, such as spin polarization approaching 100% at room temperature.

Metrology - new and improved tools and techniques to image and characterize spin-related chemical, structural, electronic, optical and magnetic properties of materials, interfaces, buried layers and structures with nanometer-scale resolution. Measurements and new nondestructive methods for probing magnetic/nonmagnetic interfaces requiring atomic-level resolution.

Chemical and Mechanical Interfaces - spin interactions between chemical or mechanical engineering systems and semiconductors relating to spin coupling dynamics, spin transport and charge transfer, magnetoelectronic interactions and structural aspects at nanoscale.

Devices and Systems - novel concepts, simulation and architectures in spin transport devices, spin quantum and coherent devices, GMR sensors and detectors, magnetoacoustic and magnetostrictive devices, MRAM, highly polarized spin sources and detectors, and integration of large scale functional devices and systems, including novel packaging techniques. Futuristic applications include spin phenomena encompassing multistate and reconfigurable logic, molecular/chemical/mechanical spin systems, hybrid systems incorporating electronics, photonics and magnetics, and integration of spin electronics with quantum computing. Innovations in sensing devices and networking through spin dynamics for detection and condition monitoring of civil and mechnical systems.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the Grant Proposal Guide are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

The awards made under this initiative will be cumulative up to $300,000 for a single investigator and up to $600,000 for a small interdisciplinary group, for a duration of three years. Small interdisciplinary groups may be from the same institution or from different institutions, and should demonstrate substantial program enhancement resulting from the interaction of diverse disciplines. It is anticipated that the total funds available from NSF for FY 2002 for this initiative will be approximately $4.5 million.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Web Site at: http://www.nsf.gov/cgi-bin/getpub?gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

Proposers are reminded to identify the program solicitation number (NSF 02-036) in the program announcement/solicitation block on the NSF Form 1207, *Cover Sheet For Proposal to the National Science Foundation*. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost sharing is not required in proposals submitted under this Program Solicitation.

Indirect Cost (F&A) Limitations: None

C. Deadline/Target Dates

Proposals must be submitted by the following date(s):

Full Proposals *by 5:00 PM local time*: March 15, 2002

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: http://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call 1-800-673-6188 or e-mail fastlane@nsf.gov.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane website at: http://www.fastlane.nsf.gov.

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

Proposals will be reviewed against the following general review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Proposers are reminded that both the intellectual merit and the broader impacts of the work to be accomplished should be addressed. While reviewers are expected to address both merit review criteria, each reviewer will be asked to address only considerations that are relevant to the proposal and for which he/she is qualified to make judgements.

What is the intellectual merit of the proposed activity?
How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?
How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Principal Investigators should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both of the above-described NSF merit review criteria. NSF staff will give these elements careful consideration in making funding decisions.

Integration of Research and Education
One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities
Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 70 percent of proposals. The time interval begins on the date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at its own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1)* or Federal Demonstration Partnership (FDP) Terms and Conditions;* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Web site at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Web site at http://www.nsf.gov/cgi-bin/getpub?gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at http://www.gpo.gov.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding Spin Electronics for the 21st Century should be made to:

- Usha Varshney, Program Director, ENG/ECS, Division of Electrical and Communications Systems, telephone: (703) 292-8339, e-mail: uvarshne@nsf.gov.
- Rajinder Khosla, Acting Division Director, ENG/ECS, Division of Electrical and Communications Systems, telephone: (703) 292-8339, e-mail: rkhosla@nsf.gov.
- Jorn Larsen-Basse, Program Director, ENG/CMS, Division of Civil and Mechanical Systems, telephone: (703) 292-8360, e-mail: jlarsenb@nsf.gov.
- Shih-Chi Liu, Program Director, ENG/CMS, Division of Civil and Mechanical Systems, telephone: (703) 292-8360, e-mail: sliu@nsf.gov.
- Maria Burka, Program Director, ENG/CTS, Division of Chemical and Transport Systems, telephone: (703) 292-7030, e-mail: mburka@nsf.gov.
- Robert Wellek, Deputy Director, ENG/CTS, Division of Chemical and Transport Systems, telephone: (703) 292-8370, e-mail: rwellek@nsf.gov.

- Robert Wellek, Deputy Director, ENG/CTS, Division of Chemical and Transport Systems, telephone: (703) 292-8370, e-mail: rwellek@nsf.gov.

- Charalabos Doumanidis, Program Director, ENG/DMII, Division of Design, Manufacture, and Industrial Innovation, telephone: 703) 292-7088, e-mail: cdoumani@nsf.gov.

- Donald Senich, Program Director, ENG/DMII, Division of Design, Manufacture, and Industrial Innovation, telephone: (703) 292-7082, e-mail: dsenich@nsf.gov.

- Mark Suskin, Program Director, SBE/INT, Office of International Science and Engineering, telephone: (703) 292-8702, e-mail: msuskin@nsf.gov.

For questions related to the use of FastLane, contact:

- Gwendolyn Owens, Administrative Officer, ENG/ECS, Electrical and Communications Systems, telephone: (703) 292-8339, e-mail: gowens@nsf.gov.

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at http://www.nsf.gov/cgi-bin/getpub?gp. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF E-Bulletin, which is updated daily on the NSF web site at http://www.nsf.gov/home/ebulletin, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's Custom News Service (http://www.nsf.gov/home/cns/start.htm) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 or (800) 281-8749, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Information Dissemination Branch, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

OMB control number: 3145-0058.